

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Tadashi SHIBATA, Eiji NAKAMURA and Hirofumi AOKI

Serial No. : 10/526,466

PCT Filed : September 1, 2003

PCT No. : PCT/JP2003/011144

For : TIRE

Art Unit & Examiner : 1791, Mr. Steven D. Maki

DECLARATION UNDER 37 CFR 1.132

ASSISTANT COMMISSIONER FOR PATENTS

PO Box 1450

Alexandria, Virginia 22313-1450

Sir:

I, Eiji NAKAMURA, in care of 3-1-1, Ogawahigashi-cho Kodaira-shi, Tokyo, Japan, declare that:

1. I am one of the named inventors of the above-identified application.
2. I graduated from Tokyo University of Agriculture and Technology and received my master's degree of Engineering in March 1991, and joined BRIDGESTONE CORPORATION in April 1991. Then, I have been engaged in the research and development of tire materials including development of compounding ingredients in Tire Material Development up to the present.
3. I am familiar with the subject matters disclosed in the application. The following

experiments were carried out by me.

4. Experiments

(1) Procedure of the Experiments

Additional Comparative Examples F to I were carried out in the same process as Examples 14 and 15 in Table 2 described in the specification of this invention.

The non-vulcanized rubber compositions obtained above were evaluated for a Moony viscosity, and the vulcanized rubber compositions were evaluated for a dynamic storage elastic modulus (E'), a driving stability, a wet gripping property and an abrasion resistance by the methods described in the specification of this invention.

(2) Results

The results obtained are shown in the following Table. Examples 14 and 15 in Table 2 described in the specification of this invention are also shown in the following Table for comparison with the Additional Comparative Examples F to I.

Table

Rubber composition blended (mass part)	Example		Comparative Example				
	14	15	F	G	H	I	
Rubber component: SBR (oil extended) ^{*10}	137.5	137.5	137.5	137.5	137.5	137.5	
butadiene rubber ^{*11}	-	-	-	-	-	-	
natural rubber	-	-	-	-	-	-	
Filler: carbon black ^{*12}	45	45	45	45	45	45	
silica ^{*13}	45	45	45	45	45	45	
aluminum hydroxide ^{*14}	10	10	10	10	10	10	
Partial ester ^{*15}	1.5	1.5	-	1.5	-	-	
Silane coupling agent ^{*16}	4.5	4.5	4.5	4.5	4.5	4.5	
Resin: resin A ^{*17}	5	5	-	-	5	5	
resin B ^{*18}	-	5	-	-	-	5	
(Mass % of silica in the filler)	45	45	45	45	45	45	
(Total oil amount)	37.5	37.5	37.5	37.5	37.5	37.5	
Evaluation results:							
Moony viscosity (ML ₁₊₄)	60	61	80	63	80	81	
Dynamic storage elastic modulus E' (MPa)	15.6	17	12.0	11.0	14.0	16.0	
Driving stability (index)	112	116	95	93	110	114	
Wet gripping property (index)	121	121	108	108	120	121	
Abrasion resistance (index)	90	91	92	93	91	92	

Remarks:

- *10 SBR (oil extended): brand name "SBR 1712" (oil-extended rubber containing 37.5 mass parts of an aromatic oil per 100 mass parts of rubber component, manufactured by JSR Co., Ltd.)
- *11 Butadiene rubber: brand name "BR01" (cis-1,4-polybutadiene, manufactured by JSR Co., Ltd.)
- *12 Carbon black: SAF grade (manufactured by Tokai Carbon Co., Ltd.)
- *13 Silica: brand name "Nipseal AQ" (N₂SA: 210 m²/g, manufactured by Nippon Silica Ind. Co., Ltd.)
- *14 Aluminum hydroxide: brand name "Higilite 43M" (manufactured by Showa Denko Co., Ltd.)
- *15 Partial ester: mono[POP(5) lauryl ether] maleic acid ester
- *16 Silane coupling agent: brand name "Si 69" (manufactured by Degussa Co., Ltd.)
- *17 Resin A: C₈ base petroleum resin (manufactured by Struktol Co., Ltd.)
- *18 Resin B: brand name "Novatec" (polyethylene base resin, manufactured by Japan Polychem Corp.)

5. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 2008/11/26By: Eiji Nakamura
Eiji NAKAMURA

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Sir:

I, Motoyuki MAMIYA, in care of 3-1-1, Ogawahigashi-cho Kodaira-shi, Tokyo, Japan, declare that:

1. I graduated from Tokyo University of Science and received my master's degree of Engineering in March 1997, and joined BRIDGESTONE CORPORATION in May 1999. Then, I have been engaged in the research and development of tire materials including development of compounding ingredients in Tire Material Development up to the present.

2. I am familiar with the subject matters disclosed in the application. The following experiments were carried out by me.

3. Experiments

(1) Procedure of the Experiments

Additional Comparative Examples A to E were carried out in the same process as Examples 2 and 3 in Table 1 described in the specification of this invention.

The non-vulcanized rubber compositions obtained above were measured for a Moony viscosity. The vulcanized rubber compositions obtained by vulcanizing the above non-vulcanized rubber compositions at 150°C for 30 minutes were evaluated for a heat build-up property and an abrasion resistance by the methods described in the specification of this invention.

(2) Results

The results obtained are shown in the following Table. Examples 2 and 3 in Table 1 described in the specification of this invention are also shown in the following Table for comparison with the Additional Comparative Examples A to E.

Table

Rubber composition blended (mass part)		Example		Comparative Example				
		2	3	A	B	C	D	E
Polymer mass part	Natural rubber	100	100	100	100	100	100	100
	SBR ^{*1}	-	-	-	-	-	-	-
	BR ^{*2}	-	-	-	-	-	-	-
Silica ^{*3}	mass part	10	10	10	10	10	10	10
	(N ₂ SA)	(235)	(235)	(235)	(235)	(235)	(235)	(235)
	(DPB)	(250)	(250)	(250)	(250)	(250)	(250)	(250)
Carbon	mass part	40	40	40	40	40	40	40
	(N ₂ SA)	(110)	(110)	(110)	(110)	(110)	(110)	(110)
	(DPB)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Ester compound ^{*4}		1	3	0.5	1	-	3	-
Antioxidant 6C ^{*5}		1	1	1	1	1	1	1
Stearic acid		2	2	2	2	2	2	2
Wax ^{*6}		2	2	2	2	2	2	2
Zinc oxide		3	3	3	3	3	3	3
Vulcanization accelerator CZ ^{*7}		1.4	0.8	1.5	1.4	1.4	0.8	0.8
Sulfur		1.3	1.3	1.7	1.3	1.3	1.3	1.3
Coupling agent ^{*8}		-	-	-	-	-	-	-
Hydrazide compound ^{*9}		0.5	1.5	-	-	0.5	-	1.5
Evaluation results:								
Moony viscosity (ML1+4)		91	88	95	95	101	87	102
heat build-up property (index)		105	110	101	100	100	102	105
Abrasion resistance (index)		110	110	110	110	110	110	107

Remarks:

- *1 SBR: emulsion-polymerized SBR, brand name "JSR #1500", manufactured by JSR Co., Ltd.
- *2 BR: polybutadiene rubber, brand name "150L", manufactured by Ube Kosan Co., Ltd.
- *3 Silica: brand name "Nipsil KQ" (N_2SA : 235 m²/g, manufactured by Nippon Silica Ind. Co., Ltd.)
- *4 Ester compound: mono [POP(5) lauryl ether] maleic acid ester
- *5 Antioxidant 6C: N-phenyl-N'-(1,3-dimethylbutyl)-p-phenylenediamine
- *6 Wax: brand name "WMO2", manufactured by Seiko Chemical Co., Ltd.
- *7 Vulcanization accelerator CZ: N-cyclohexyl-2-benzothiazylsulfeneamide
- *8 Coupling agent: brand name "Si 69", manufactured by Degussa Co., Ltd.
- *9 Hydrazide compound: 2-hydroxy-N'-(1,3-dimethylbutylidene)-3-naphthoic acid hydrazide

4. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 2008/11/25By: Motoyuki Mamiya

Motoyuki MAMIYA